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ABSTRACT

Psychological modeling, the phenomenon referring to the tendency of individuals to imitate higher status persons, peer group members, and other relevant models, has been used as a device for modification of existing behavior and acquisition of previously unlearned behavior. In this study, 48 preservice teachers were randomly assigned to two modeling treatments and a control group. Subjects in the modeling treatments observed either a video model or an audio model. Each subject prepared and microtaught a lesson to three elementary students. The microteaching session was audiorecorded and the audiorecordings were later rated for types and frequencies of teacher questions and student responses. Both modeling treatments were superior to the control in producing the appropriate responses. Students exposed to teachers trained with the models performed significantly better than the control group on the audio interaction measures. (The report includes tables illustrating treatment procedures, variance in dependent variables, and deviations of audio and written measures; and a reference list.) (JS)

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EFFECTS OF VIDEO AND AUDIO MODELS ON THE ACQUISITION OF A TEACHING SKILL AND CONCOMITANT STUDENT LEARNING

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Forty-eight preservice teachers were randomly assigned to two modeling treatments and a control group. Subjects in the modeling treatments either observed a video model or an audio model. Each subject prepared and microtaught a lesson to three elementary students. The microteaching session was audiorecorded and the audiorecordings were later rated for types and frequencies of teacher questions and student responses. Both modeling treatments were superior to the control in producing the appropriate responses. Students exposed to teachers trained via the models performed significantly better than the control on the audio interaction measures.

Psychological modeling has been shown to be an effective and powerful device for the modification of existing behavior and the acquisition of previously unlearned behavior. More commonly termed modeling or observational learning, the phenomenon refers to the tendency of individuals to imitate higher status persons, peer group members and other relevant models (Bandura and Walters, 1963). The modeling process may be conveyed in a number of different ways. The most common form of modeling is the live model where children and adults observe others and adapt many of their behaviors. With the advent of films and television, film-mediated models have become increasingly important in the modification of behavior (Bronfenbrenner, 1970). Models conveyed via written communications display promise and may have wide application as educational devices.

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Bandura and Walters (1963) have outlined three main effects derived from the observation of a model. 1) The observer may acquire new responses that did not previously exist in his repertoire. 2) Through observation of a model an individual performs a behavior that had not previously been produced. 3) The observation of a model may strengthen or weaken existing responses, or the model may increase or decrease the frequency of behaviors already possessed by the observer. Another characteristic of the modeling process is that the observation of a model being either rewarded or punished may increase or decrease the performance of the observed behavior. Behaviors displayed by the model may be acquired without the observer overtly reproducing the behavior, and the newly acquired behaviors may be stored and later used if an appropriate set of circumstances develops. This is the acquisition-performance phenomenon described by Bronfenbrenner (1970) and suggested by research (Bandura et al., 1963; Bandura, 1971; Koran, 1969, 1970, 1971).

Various modeling approaches are encouraging as techniques for training teachers. Videotape models have been studied and found effective in promoting questioning behavior change in preservice teachers (Koran, 1969, 1970, 1971). In these studies, Koran has shown that the observation of an appropriate model will produce the desired behavior significantly more often than if the model is not observed. Two forms of written models were investigated by Koran et al. (1973) on the acquisition of analytic questioning behaviors of preservice teachers. In this study the Ss were presented with either a written protocol of appropriate analytic questioning strategies, a written transcript of the same strategies or a no-model treatment. Results reported by Koran et al. (1973) show that both written models were superior to a no-model condition.

Although there is substantial evidence to support the efficacies of both video and written models there is a scarcity of information in the literature on the effect of audio models on learning. Yet, most of the behaviors exhibited by teachers and students center on verbal communications. It appears reasonable to develop audio models depicting desired teacher behaviors and test these models experimentally. There are also some pragmatic considerations in examing the nature of audio models. Low production costs, ease of distribution and wide applicability are factors that encourage examination of this instructional method.

It is not sufficient to train teachers to perform theoretically appropriate behaviors. There should be a positive relationship between teacher classroom behavior and student cognitive and affective outcomes. The relationship between teacher behavior and student outcomes is often difficult to discern as evidenced by the lack of conclusive research findings (Siegel and Rosenshine, 1973). Soar (1973) has described some of the difficulties in relating teacher behaviors and student outcomes and suggests that many factors other than teacher performance influence student outcomes. Peer group pressures, parental expectations and student attitudes are among these factors. Soar further states that measurement of student growth is yet another problem in establishing the relationship between teacher performance and student outcomes. Regression effects, ceiling effects on tests, and the types of behaviors measured (critical thinking and problem-solving versus simple-concrete pupil growth) also act as barriers to establishing the relationships between teacher performance and student outcomes.

The purposes of this study were: (1) to compare the effects of videotape and audio models on the acquisition of a teaching skill and (2) to validate the skill in terms of elementary student learning. It was hypothesized that the video model would be more effective than the audio model and that both models would be superior to the no-model condition in producing the desired behavior. The video model treatment observed a 10-minute tape of a teacher asking observation and classification questions of four fourth grade students. The model was rich in both manipulative and verbal behaviors. The teaching skill portrayed by the model was not verbally highlighted. That is, the model did not state that she was asking observation and classification questions. The audio model, an audiorecording of the video model, conveyed only the verbal teacher-student interaction. It was further hypothesized that students taught by modeling treatment subjects would respond more often to observation and classification questions that students taught by no-model treatment subjects.

METHOD

Subjects

Forty-eight preservice teachers, enrolled in two sections of a general curriculum course at the University of Florida, were selected as subjects for this study. All preservice teachers were college seniors working on kindergarten-through-twelfth grade teacher certification in either music, physical education, or library science. None of the preservice teachers had participated in student teaching. One hundred eighty-four third and fourth grade students enrolled at a local elementary

school were chosen as microteaching subjects. Neighborhoods from which much of the student population was drawn can be characterized as lower-middle class. Busing to achieve racial balance was in effect.

Procedure

Preservice teachers were randomly assigned to one of the three treatment groups: video model, audio model and control no-model treatments. A set induction, generally describing concept formation, and instructions on the task to be performed were administered to each preservice teacher upon arrival at the school. All Ss viewed the Science-A Process Approach observation and classification materials before continuing with the treatments. The materials consisted of colored blocks, assorted balloons and geometric shapes fashioned from construction paper. After observing the model, modeling treatment Ss prepared a microteaching lesson using the Science-A Approach materials. Control Ss did not observe the model but immediately began preparing the microteaching lesson using the same materials.

Elementary students were randomly assigned to teachers or to a no-microteaching group. This latter group was employed to measure student baseline written performance on the student process test. Once students were seated, the preservice teacher was reminded to teach at least 15 minutes, the audio cassette recorder was started, and the experimenter left the room. After 15 minutes the experimenter shut off the audio cassette recorder, requested that the materials be put into a box, and administered written tests to the preservice teacher and the microteaching students. Students were read the test directions and words were pronounced if a request for help was made. Twenty minutes were available to

complete the tests but neither preservice teachers nor microteaching students required the allotted time. Treatment procedures are listed in Table 1.

Preservice teachers received a 28-item criterion test requiring the selection of those statements or questions that were observations, classifications, or neither. Students were administered a 20-item process test designed to measure their acquisition of observation and classification processes. Geometric figures, such as triangles, rectangles and circles, along with a few terms, were categorized according to individual item critera. Reliabilities for the written measures of .67 and .86 respectively were computed using Cronbach's Alpa (1970).

Three trained raters analyzed audiotapes for frequencies and categories of observation questions by preservice teachers, frequencies and categories of classification questions, and frequency and categories of student responses. Observation questions required the student to identify a particular characteristic of an object such as its shape, color, or texture. Questions such as: "What color is this?" and "How does this feel?" are examples of observation questions. Classification questions required students to compare, contrast, or group objects by similarities and dissimilarities. Teacher-imposed categories required the student to classify objects by characteristics the teacher selects. "Which colors belong together?" and "Which are the rough ones?" are examples of teacher-imposed categories. In each of the latter questions the teacher told the student which characteristics are to be considered in classifying the objects presented. Student-imposed classification questions required the student to select an appropriate

characteristic for categorizing objects. Examples of student-imposed category for classification, he allowed the student to devise a scheme for classification. Correct student responses to observation and classification questions were tabulated under the appropriate student response category and mean rater reliabilities were computed using an analysis of variance procedure described by Winer (1962). Reliabilities for the six audiotape dependent variables ranged from .83 to .92.

RESULTS AND DISCUSSION

Multivariate analyses of variance were performed for teacher and student audio interaction dependent variables. The three teacher dependent variables were observation questions (OQ), teacher-imposed classification questions (TI), and student-imposed classification questions (SI). Student responses to the three teacher dependent variables were responses to observation questions (ROQ), responses to teacher-imposed classification questions (RTI), and responses to student-imposed classification questions (RSI). Treatment main effects were found for the teacher audio interaction dependent variables ($F=5.01$; $df=6,86$; $p<.01$). Examination of the univariate F tests and comparison of the means (Tukey's HSD tests) strongly support the hypothesis that the modeling treatments were superior to the control. No significant differences were found between modeling treatments. Lack of significant differences on the SI category suggests that this is a more difficult behavior to acquire. Various exposures to the model may be required before the number of SI questions generated by the Ss increases.

Analysis of student audio interaction dependent variables reflected

significant main effects ($F=4.53$; $df=2,86$; $p<.01$). Further analysis revealed that students taught by model treatment Ss responded more often than students taught by no-model Ss. Tables 2 and 3 report the results of the univariate analyses of variance. Means and standard deviations for all dependent variables are presented in Tables 4 and 5. Correlations between audio interaction dependent variables clearly shows that the number of questions asked by teachers was highly related to the number of student responses within each of the three audio interaction categories examined (Table 6).

One-way analyses of variance were used to examine teacher criterion test and student process test main effects. A significant difference was found for the teacher criterion test ($p<.05$). Tukey's HSD test indicated that the audio model Ss performed significantly better than the control Ss. No significant differences were found between the audio and video model Ss. No significant differences were found for the student process test.

In review, the purpose of this study was two-fold. First, the effects of video and audio models as alternative teacher training methods were examined. Second, validation of acquired teacher behavior in terms of student learning was attempted. The observed results suggest that both video and audio models are effective in producing the types of behaviors in preservice teachers displayed by the model. What is somewhat surprising is that Ss observing the audio model performed as well as the video model Ss during the microteaching lesson. Both modeling treatment Ss were more effective than the no-model treatment in the frequency of observation and classification questions asked.

The essential behaviors displayed by the model centered on the verbal interaction between teacher and students. The model teacher asked questions and elicited operations while the students responded to these questions and operations. Ss observing the video model received stimuli through visual and auditory receptors while audio modeling Ss were restricted to observing the model via the auditory receptors. Although more stimuli were available to the video model Ss their performance was not significantly different than the audio model Ss. A possible explanation for the lack of support for the video models' superiority is that the added information gathered from the observation of the model by the visual mode may have been superfluous. For the behaviors required in this study the verbal component of each model was the essential element in the communication. Additional imput did not appreciably facilitate acquisition of the teaching skill. Another explanation is that although fewer stimuli were available through the audio model, the Ss were required to focus on the audio-interaction more closely than the video model Ss. When the model asked for manipulations of objects the audio model Ss covertly performed similar tasks. This covert manipulation served as a practice variable, thus compensating for the lack of visual stimuli.

The attempt to validate the teacher behavior in terms of student learning was partially successful. Students taught by the modeling Ss performed significantly better than the control. Modeling treatment students responded more frequently to questions initiated by pre-service teachers. According to research and theoretical considerations on modeling, students will tend to model those individuals that exhibit

greater control over the environment. Teachers asking high frequencies of questions in various categories can be thought of as having control over the environment. It can then be expected that transfer of observation and classification skills will occur for students taught by modeling treatment teachers. Students will perform the acquired behaviors when they encounter situations requiring the observing and classifying of objects and events.

This study suggests that audio models may be effective teacher training devices when the skill to be acquired is verbal. Since very many teaching skills center on verbal behavior, audio models may have wide applicability in teacher training. As an extension, audio models may prove to be significant instructional procedures within elementary and secondary school classrooms.

Table 1

TREATMENT PROCEDURES

Step	Treatment Group				Time
	Video Modeling	Audio Modeling	No Modeling	Students-Only No Lesson	
Set Induction Introduce a) Concept b) Procedure c) Materials	X	X	X		5 minutes
Observation of Model	X	X			10 minutes
Develop Lesson	X	X	X		5 minutes
Microteaching Session	X	X	X		15 minutes
Testing Teacher Criterion Test	X	X	X		
Student Process Test	X	X	X	X	

[a]Total time: teachers, 55 minutes; students 35 minutes

Note--Symbol X indicates that the procedure was administered to all subjects within that treatment.

Table 2

ANALYSIS OF VARIANCE -- TEACHER DEPENDENT VARIABLES

Source of Variation	df	OQ		TI		SI		Criterion Test	
		MS	F	MS	F	MS	F	MS	F
Between groups	2	124.69	6.87**	137.87	8.64**	52.77	2.76	55.85	3.77*
Within groups	45	18.15		15.95		19.12		14.82	
Total	47								

N = 48
*p < .05
**p < .01

Table 3

ANALYSIS OF VARIANCE -- STUDENT DEPENDENT VARIABLES

Source of Variation	df	ROQ		RTI		RSI		Process Test*	
		MS	F	MS	F	MS	F	MS	F
Between groups	2	112.51	6.28**	115.40	8.23**	40.43	2.47	4.35	0.18
Within groups	45	17.93		14.02		16.35		23.63	
Total	47								

**p < .01
*df = 3,183

Table 4

MEANS AND STANDARD DEVIATIONS OF AUDIO DEPENDENT VARIABLES

Measure	Treatment Groups					
	Video[a]		Audio[b]		No-Modeling[c]	
	M	SD	M	SD	M	SD
Teacher Audio Performance						
TQQ	8.13	4.47	6.24	5.29	2.53	2.59
TTI	7.19	3.97	6.88	5.34	1.87	1.41
TSI	4.00	2.92	5.71	5.97	2.01	3.41
Student Audio Performance						
RQQ	7.81	4.25	6.18	5.26	2.53	2.59
RTI	6.50	3.45	6.29	5.18	1.67	1.29
RSI	4.13	3.22	5.06	5.29	1.93	3.08

[a] n = 16; [b] n = 17; [c] n = 15

Table 5

MEANS AND STANDARD DEVIATION OF WRITTEN MEASURES

Measure	Treatment groups							
	Video Modeling		Audio Modeling		No Modeling		Students-Only No Lesson	
	M	SD	M	SD	M	SD	M	SD
Teacher Criterior Test	13.31	3.38	14.94	3.81	11.20	4.33		
Student Process Test	14.94[a]	5.07	15.57[b]	4.49	15.38[c]	4.77	15.00[d]	5.15

[a] n = 48; [b] n = 51; [c] n = 45; [d] n = 40

Table 6

CORRELATIONS AMONG AUDIO DEPENDENT VARIABLES

OQ	ROQ	T-I	RTI	S-I	RST
1.00	.99**	.31*	.30*	.01	.06
	1.00	.31*	.30*	.02	.06
		1.00	.99**	.17	.21
			1.00	.14	.18
				1.00	.99**
					1.00

*$p < .05$
**$p < .01$

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